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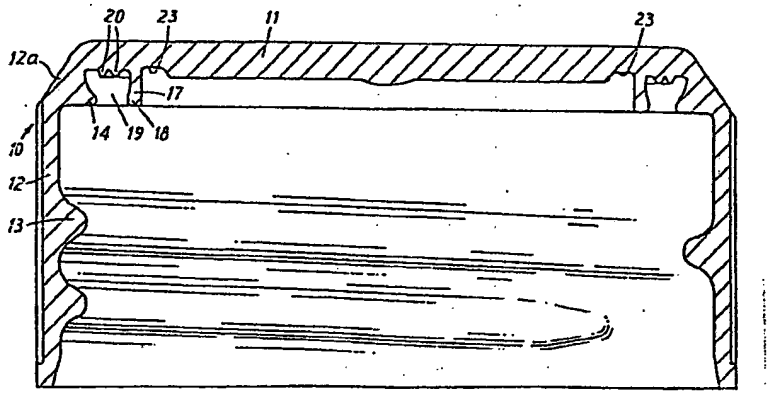
(54) **Improvements relating to closures.**

(57) A closure for the externally screw-threaded neck of a container such as a bottle is moulded in one piece from a plastics material and comprises a top 11 and a depending skirt 12 which has an internal screw-threaded ridge 13. A sealing rib 14 projects radially inward from the skirt above the screw thread-ridge and a flange 17 depends from the top of the closure and is thickened at or adjacent its lower end to form a radially outwardly projecting second sealing rib 18. Additional sealing ribs 20 project downward from the top into the channel formed jointly by the flange 17, skirt 12 and top 11.

FIG. 1



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IMPROVEMENTS RELATING TO CLOSURES

This invention relates to closures for containers having externally screw-threaded necks.

According to this invention there is provided a closure for application to a container having an externally threaded neck, which closure is moulded in one piece from a resilient plastics material and comprises a top and a depending skirt having an internal screw-thread ridge, a first annular sealing rib extending radially inward beyond the screw-thread ridge from the internal surface of the skirt at a location above the screw-thread and spaced below the top of the closure for forming a seal with the radially outer face of the neck by radially outward deformation of the rib, and an annular flange projecting downward from the top of the closure and having a portion of increased radial thickness at or adjacent the lower end of the flange thereby to provide a second sealing rib which is adapted to form a seal with the internal surface of the neck of the container by radially inward deformation of the second rib and/or the flange, the two sealing ribs being disposed substantially in radial alignment with each other.

According to a preferred feature of the invention at least one additional annular sealing rib projects downward from the top if the closure at a location between and radially spaced from the skirt and said flange.

In preferred arrangements according to the invention an annular channel is formed in the underside of the top at a location adjacent and radially inward of the flange.

The portions of said first and second ribs remote from the top are preferably chamfered or radiussed to provide a lead-in for the top edge of the neck of the container.

The flange preferably has a progressively increasing thickness in a downward direction from a point adjacent the top and is preferably capable of flexing radially outward about its line of minimum thickness under a pressure obtaining in the container. In one arrangement the said additional sealing rib or ribs are of truncated conical section, the base of the cone being contiguous with said top of the closure.

The invention will now be described in more detail with reference to the accompanying drawings in which:

Figure 1 shows a first embodiment of the invention in axial section, and

Figure 2 shows part of Figure 1 on a larger scale.

Referring to the drawings a closure 10 is moulded in one piece from a resilient plastics material. The closure is designed to provide a seal for a bottle containing a beverage under pressure e.g. a carbonated pressure and to be usable to re-seal the bottle after part of its contents have been removed. The closure has a top 11 and a skirt 12 which is internally screw-threaded, and externally knurled for improved manual grip. Above its screw-thread ridge 13 and adjacent the top the skirt has an internal radially-inwardly projecting sealing rib 14 the tip 15 of which extends inward to a greater extent than the screw-thread ridge 13.

The tip 15 of the rib is in this instance radiussed. The rib is of stiff, broad based generally triangular form and is designed to achieve sealing in contact with the outer surface of the neck of the bottle by virtue of the sealing pressure deriving from the resulting hoop stresses in the rib, so that instead of the rib buckling or becoming turned back on itself as would be the case if a thin fin were employed, the radiussed tip of the rib tends to become flattened

The portion 12a of the skirt extending upward from the location of the sealing rib 14 to the top 11 is conically inclined inwardly.

Spaced radially inwardly from rib 14 the top 11 has a downwardly extending flange 17 having at its free end a lip or rib 18 which is radiussed and projects towards rib 14 in substantially radial alignment therewith. The ribs 14, 18 and the top together define an annular channel 19 to receive and form a seal with the top edge portions of the neck of the bottle, and the top 11 has in the channel two sealing ribs 20 of truncated conical section for engaging the end face of the neck of the bottle. Viewed in section the radially inner face 21 of the flange 17 extends substantially axially and the radially outer face 22 of the flange extends in a smooth curve from a position adjacent the top, so that any flexing of the flange due either to gaseous pressure within the container or mechanical deformation by the container takes place about the thinnest section of the flange. A groove or channel 23 in the top is formed immediately radially inward of the flange and serves similarly to act as a hinge section for deformation of the central area of the top due to gas pressure within the container and thus to insulate the flange from the forces causing the deformation of the top.

In use of the closure, the end portion of the neck of the bottle is forced into the channel, assisted by the lead-in formed by the curved form of the ribs 14, 18 as the closure is screwed home so that the sealing ribs 14 and 18 can engage external and internal surfaces respectively of the neck to form seals and so that the ribs 20 come into sealing engagement with the top end of the neck. The positions of and spacing between the ribs 14 and 18 are preferably determined in accordance with the tolerances on the neck size of the bottle. For example the tolerance on the neck diameter of a glass bottle is based on the outside diameter, and it is arranged that when the neck diameter is on the upper limit the outer rib 14 is in full sealing engagement with the neck and on the lower limit, rib 18 is in light sealing contact with the neck. The internal diameter of the neck is not the subject of tolerance but tends to be a predetermined amount less than the outside diameter and in consequence, the sealing pressure between the inner rib 18 and the internal surface of the neck tends to vary inversely as the pressure of rib 14 on the neck, so that a lighter sealing pressure by one of ribs 14, 18 is compensated by a heavier pressure by the other rib. The inner rib 18 is designed to achieve its sealing effect in contact with the neck of the bottle by reason of the hoop stresses in the rib 18 and flange resulting from radially inward deformation thereof.

If desired the flange 17 may be extended downward below the rib 18 and have its radially outer surface chamfered to provide a longer lead-in for the neck of the container.

The closure can be employed equally well with containers intended to contain liquids or substances under vacuum and containers for still liquids.

In the conventional method of manufacture of glass bottles the mouth of the bottle is formed by mould section which extends so as to form a narrow band of the radially inner and outer surfaces of the neck immediately adjoining the end of the neck. When the present closures are to be employed on bottles, therefore, it is preferred to design the closure so that the ribs 14, 18 respectively engage these same narrow bands of the outer and inner surfaces of the neck.

CLAIMS

1. A closure for application to a container having an externally threaded neck, which closure is moulded in one piece from a resilient plastics material and comprises a top and a depending skirt having an internal screw-thread ridge, a first annular sealing rib extending radially inward beyond the screw-thread ridge from the internal surface of the skirt at a location above the screw-thread and spaced below the top of the closure for forming a seal with the radially outer face of the neck by radially outward deformation of the rib, and an annular flange projecting downward from the top of the closure and having a portion of increased radial thickness at or adjacent the lower end of the flange thereby to provide a second sealing rib which is adapted to form a seal with the internal surface of the neck of the container by radially inward deformation of the second rib and/or the flange, the two sealing ribs being disposed substantially in radial alignment with each other.

2. A closure as claimed in claim 1, wherein at least one additional annular sealing rib projects downward from the top of the closure at a location between and radially spaced from the skirt and said flange.

3. A closure as claimed in claim 2, wherein said additional rib or ribs are of truncated conical section.

4. A closure as claimed in any one of claims 1 to 3, wherein an annular channel is formed in the top of the closure at a location radially inward of said flange.

5. A closure as claimed in claim 4, wherein said annular channel is formed in the underside of the top radially inward of and adjacent said flange.

6. A closure as claimed in any one of the preceding claims, wherein the radially inner extremity of said first annular sealing rib is radiussed.

7. A closure as claimed in any one of the preceding claims wherein the radially outer extremity of said second sealing rib is radiussed.

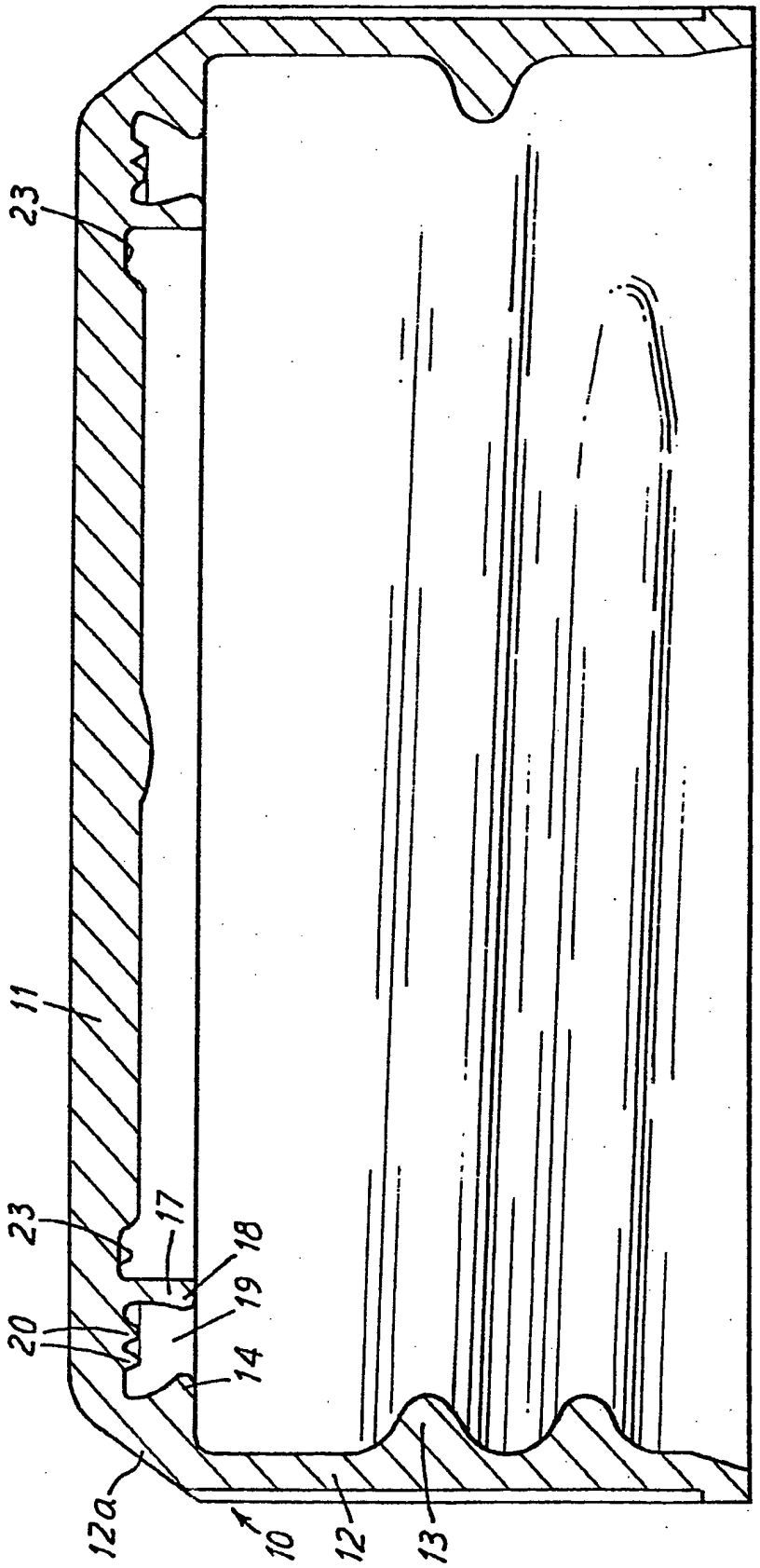

FIG. 1

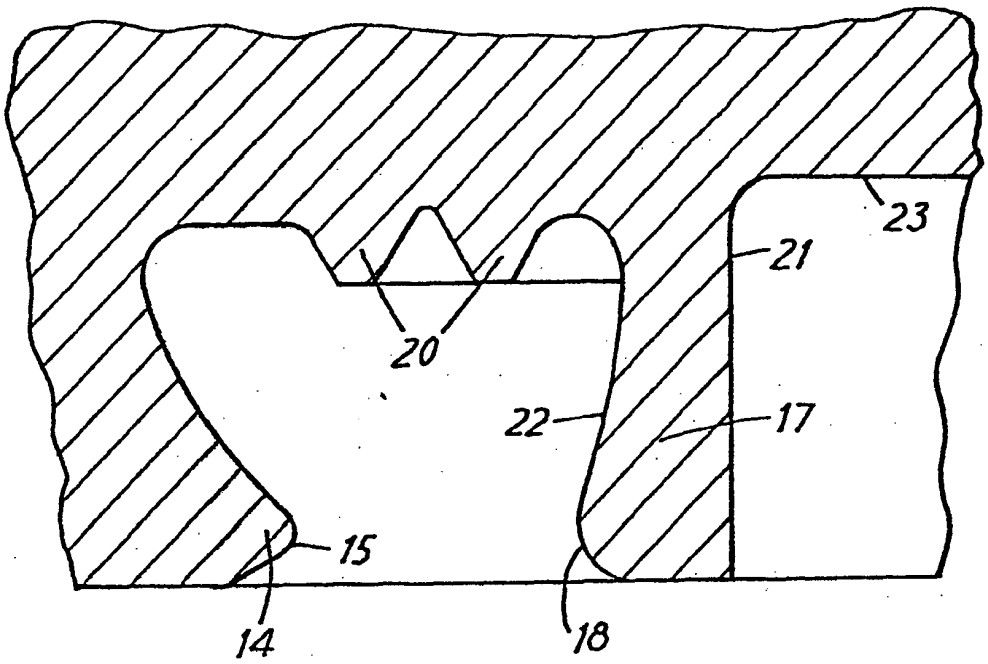

FIG. 2